

# The military requirements for a Battle Management Language

Major Kevin Galvin MERCIAN  
British Army (1972 – Now)

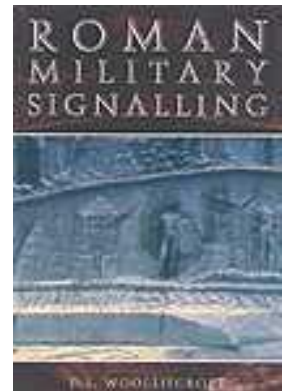
Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE <b>FEB 2010</b>		2. REPORT TYPE <b>N/A</b>		3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>The military requirements for a Battle Management Language</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>British Army</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADA564685. 2010 Coalition Battle Management Language Workshop (Atelier 2010 sur le langage de gestion du champ de bataille pour les operations en coalition). RTO-MP-MSG-079</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>SAR</b>	18. NUMBER OF PAGES <b>18</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

# The Requirement to pass Information

- Military Forces have always required a means to communicate information on operations.
- Through the ages mechanisms to relay information or orders that were clear and concise were developed. In essence they needed to be understood so that the recipient could take the appropriate action.
- These were all Battle Management Languages

# Roman Military Signalling on Hadrian's Wall

- Every mile castle and fort along Hadrian's Wall was in line of sight with signal towers. They used two groups of 5 flags were used to signal with an alphabet on a crib sheet for interpretation. For example, two flags raised on left and one on right might meant the letter 'A'.
- Beacons were also used in conjunction with amphorae of water. Each signal station would have an identical amphora containing a float with graduated marks which indicated certain messages, e.g. "send for the cavalry." At the signal of a lighted beacon the stopper would be removed and water poured out until the appropriate marker was reached. The Beacon would be waved again and both signal stations should have the float at the same point in the water and each read the same message.
- The principal of codes used by the Romans is used in electronic communications today.
- The Roman Army also used Musicians, in this case, the cornicen, were used to play salutes to senior officers, but their main job was signalling orders.



# Smoke Signals

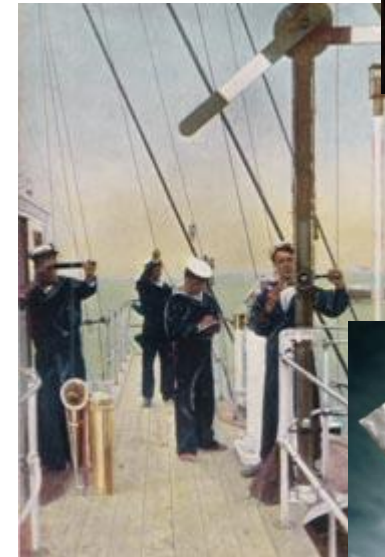
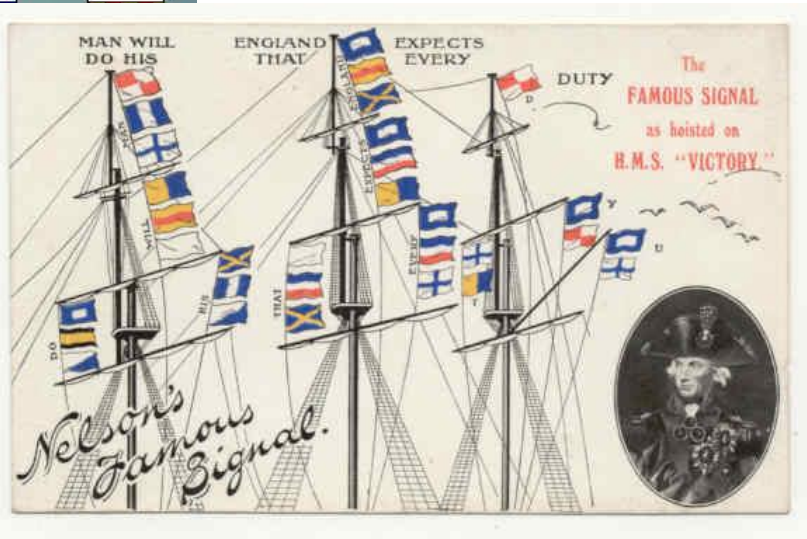
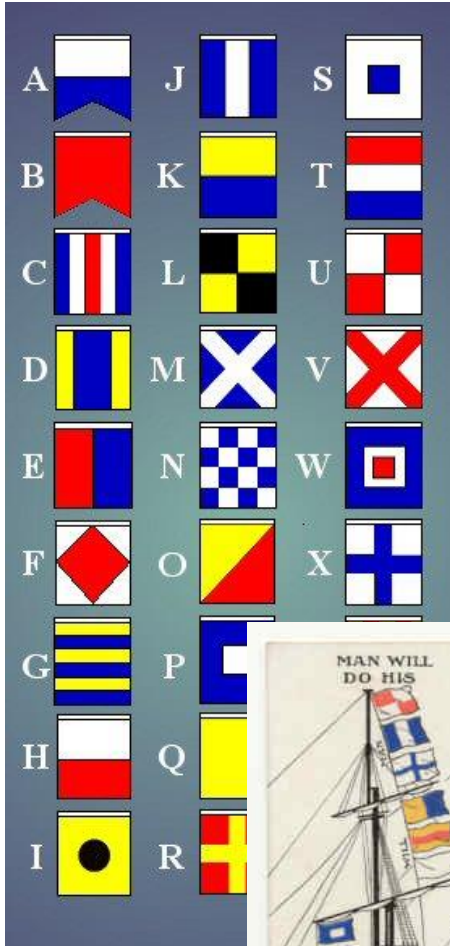


Native Americans sent signals through the air. Smoke Signals which connected people miles apart ...sharing important information ... the first Internet ...Smoke Signals



# Naval Signalling

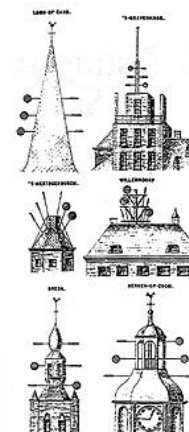
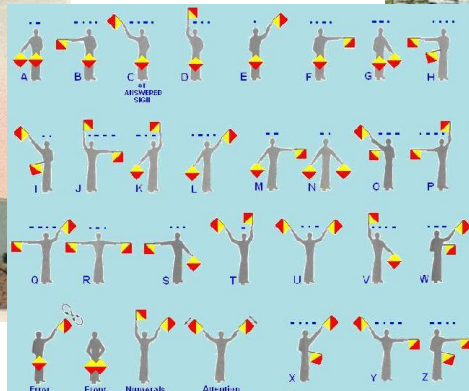
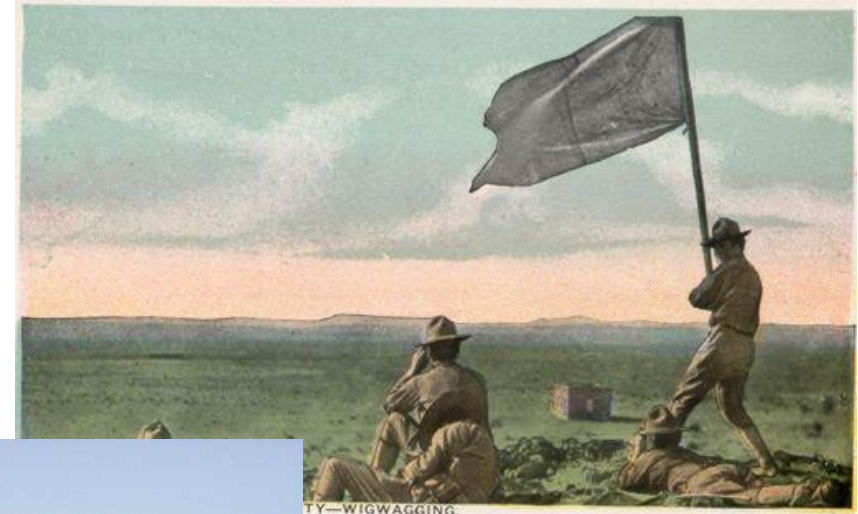
Semaphore method of signalling was an old favourite of the Navy because it was the fastest way of sending messages by flags and is even faster than flashing light. It can be used only in the daytime and at distances of less than 2 miles. It is even more secure than light signalling because there is less chance of interception by an adversary.



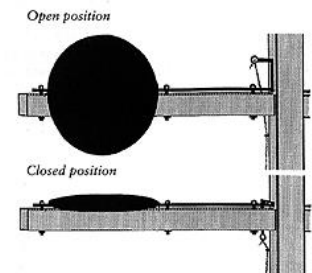


# Army Signalling

By the 1870s two methods of Signalling families were identified, WIRED (Telegraph-lines) and WIRELESS, (Flag, lamp, heliograph, mechanical telegraph or semaphore, beacons, cannon or firework and later "Verey pistols", the horse and later motorcycle dispatch rider, and often forgotten, the dispatch cyclist and the human runner or animal messenger).



## The Dutch Six-Disc Telegraph System



*Detail sketch of the operation of the panel control mechanism for the Oost Seimpost optical telegraph*

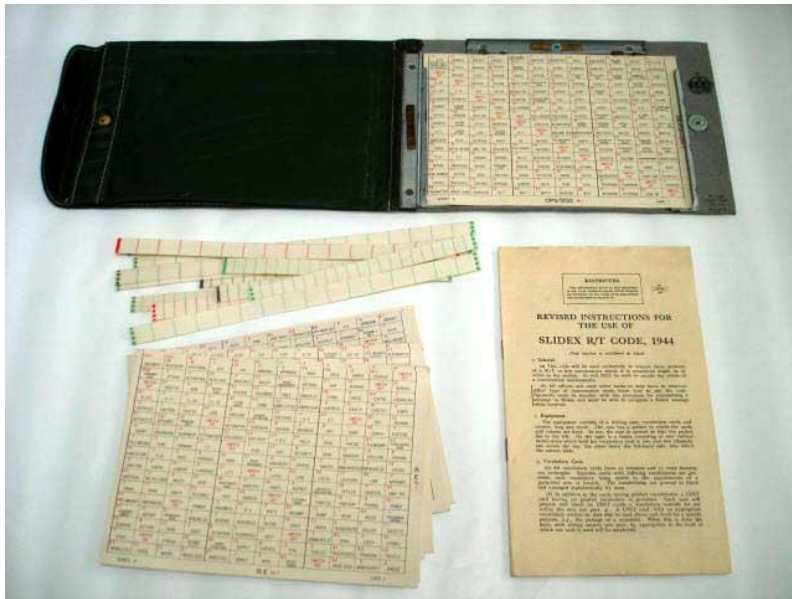
# Military Radio

- The development of radio enabled information to be passed over greater distances by armed forces.
- By itself however it was not secure and a number of encryption or coding devices were developed.





# Mechanisms for passing information by British Armed Forces by Radio



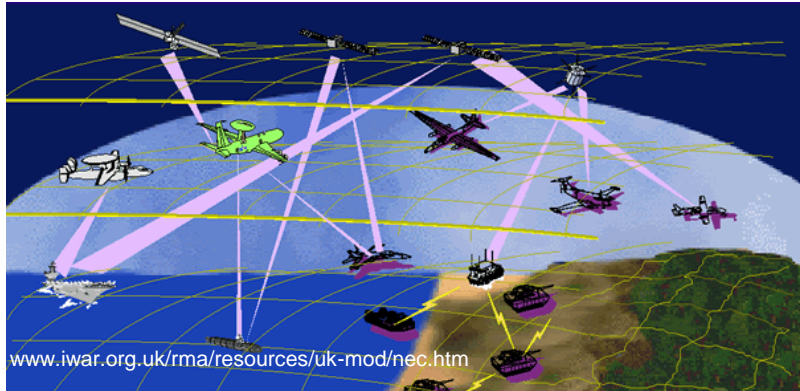
**SLIDEX**

A	07	14	24	AM CLOSING DOWN REOPENING AT	41	AMERICAN
ATK	ADVANCE	AIRCRAFT	AIRFIELD			
ASSUME CONTINUOUS WATCH ON FREQUENCY.	08	P	25	BE PREPARED TO	42	BLOCK
	ATTACK	BARRAGE		BEARING/DIRECTION		
SWITCH ON	H	15	U	34	43	54
	BRIGADE	CABLE	CANADIAN	CANCEL	CAPTURE	
D(1g) CLOSE	Q	26	26	35	44	
	CODESIGN	COLUMN	COMPLETE(D)	CONCENTRATE (ON)		
00	I	16	V	A	G	54
CUT OFF	D.R.	DAY	DELAY	DEMOLITION	DIVERSION	
01	09	SWITCH ON	27	36	45	
ENGAGEMENT	ENGINEERS	ON	ESSENTIAL	ESTABLISH	ESTIMATED TIME OF ARRIVAL	
B	J	17	28	B	46	54
FORWARD	FORWARD TROOPS	FREQUENCY	FRONT	FULLERPHONE	GAP	GAS
C	1(1g)	R	SWITCH OFF	37	H	O
HARASS	HARBOUR	HELD UP	OFF	HELP	HIGH GROUND	HOLD(ING)
2	K	18	29	SWITCH OFF	47	55
INFANTRY	INFORM (ACTION)	INTACT	INTENTION		JUNCTION	KILOMETRE(S)

ARMY CODE NO.	BATCO VOCABULARY CARD	CARD ENVELOPE
6000	UNIT	
05 CHANGE TO CARD 05 FOL	32 CHANGE TO CARD 32	62 DOL (F FOL)
01 GR (A FOL)	33 CHANGE TO CARD 33	63 GR (A FOL)
02 REPORT NO (F FOL)	34 SPELLING STARTS	67 FIGURES
ADVANCE ATTACK	39 WIN COM	68 WIN (FOL)
06 ADV	38 MOVE TO GR (A FOL)	69 WIN IN CONTACT
04 AMBUSH	37 GO	70 WIN OUT OF CONTACT
05 ASSEMBLY	36 GO	71 APPROACH FROM
07 ASSEMBLY AREA	35 GO	72 COMMAND POINTS (F FOL)
08 ASSEMBLY AREA GR (A FOL)	34 GO LINE	1-NORTH 2-NORTH EAST
09 ATTACK	33 GO	3-EAST 4-SOUTH EAST
10 AXIS	32 GO TO ASSEMBLY AREA	5-SOUTH 6-SOUTH WEST
11 BOUND (F FOL) NOW	31 GO TO FLIP	7-WEST 8-NORTH WEST
12 BY PASS	30 GO	73 EASTING (F FOL)
13 CONTACT POINT	29 REL PT AT GR (A FOL)	74 LEFT
14 COORD PT	28 RECHS AT GR (A FOL)	75 LEFT FLANKING
15 CLEARED ROUTE	27 REPORT LINE (F FOL)	77 NORTHING (F FOL)
16 CLEARANCE (F FOL)	26 RIVER	78 RIGHT
17 COM AREA	25 RIVER EAST GR (A FOL)	79 RIGHT AND
18 EN	24 ROUTE	80 RIGHT FLANKING
19 END SP GR GR (A FOL)	23 ROUTE TO ASSEMBLY AREA	81
20 FLANK PROTECTION PM GR	22 ROUTE TO FLIP	82
21 FROM GR (A FOL) TO GR	21 START LINE	83
22 FLIP	20 START PT AT GR (A FOL)	84
23 FLIP GR (A FOL)	19 FROM LINE	85
24 HELD OFF GR (A FOL)	18 MUSTER AT GR (A FOL)	86
25 HIDE	17 MUSTER AT GR (A FOL)	87
26 HIDE AT GR (A FOL)	16 WITHDRAWAL	88
27 LIMIT OF EXPLOITATION	15 BREAK CLEAR	89
28 LIMIT OF EXPLOITATION	14 DENIAL TIME (A FOL)	90
29 MAXIMUM BEYOND DEL	13 NO REARWARD MOV	91
30 MAXIMUM GAP	12 BEFORE (A FOL) HRS	92
31 MAXIMUM GAP FROM GR	11 NO THREATS OF PRESENT	93
32 MAXIMUM GAP FROM GR	10 POSN BEFORE (A FOL) HRS	94
33 MAXIMUM GAP FROM GR	9 POSN TO BE CLEAR BY	95
34 MAXIMUM GAP FROM GR	8 POSN TO BE OCCURRED	96
35 MAXIMUM GAP FROM GR	7 TIME IN (A FOL) HRS	97
36 MAXIMUM GAP FROM GR	6 TIME OUT (A FOL) HRS	98
37 MAXIMUM GAP FROM GR	5	99

**BATCO**

# The 21<sup>st</sup> Century Battlespace



**"Linking sensors, decision makers and weapon systems so that information can be translated into synchronised and overwhelming military effect at optimum tempo"**



# The problem now faced

- Today we live in a digital age and need to not only move information faster and with more accuracy over a widely dispersed battlefield, but also control **robotic forces** and conduct rapid **Course of Action analysis** and **Mission Rehearsal**.
- In the case of the latter two the use of **simulation** can greatly enhance mission effectiveness ... but they are often stand alone applications uncoupled from the digitized Command and Control systems that each nation is seeking to or are deploying.

# BML Exists Today

- It is the language found in our Field Manuals, Joint Staff Publications, NATO and other publications and it is used on a daily basis by military personnel.
- Unfortunately it lacks structure and clearly defined rules governing its use (semantics and syntax), riddled with ambiguity and overlapping definitions.
- As such incapable of transitioning to the full range of automation that many seek and will not support the advanced modelling and simulation with digitized C2.

# Easy to solve?

- In theory yes ... in practice no.
- Why? Because C2, simulations and Robotics are not developed coherently and quite often use proprietary solutions that either can not be accessed by another system or require translators to be developed in order to achieve a degree of interoperability.
- With regards to many simulations they do not have the capability of directly interfacing with C4I systems although some such as OneSAF are being developed with C4I Adaptors. In addition they require significant non-training audience intervention in order to support digital battle staff training and they will continue to do so unless and until a standardized capability is developed for communicating between these systems.
  - It was considered that the most difficult aspect of this problem was communicating mission type orders from the command nodes to the supporting simulations or robotics. Generically this was known in the US as the “Free Text Problem”.
- The current refinement and standardization of a BML is the proposed solution to this problem.
- However the requirement is not national but multi-national hence a need for a Coalition Battle Management Language (C-BML)



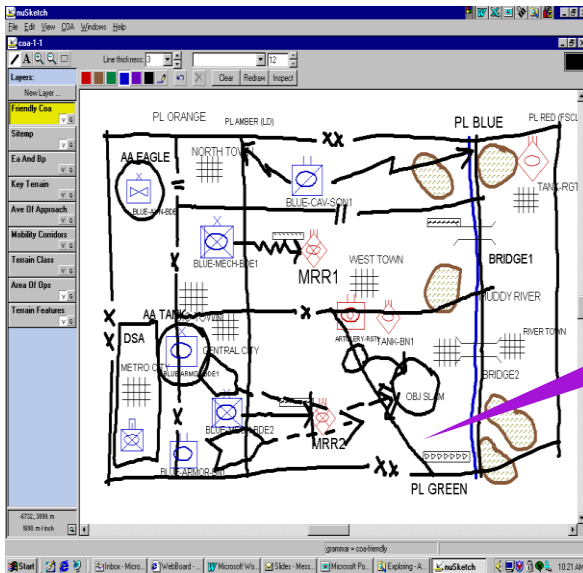
# Perceived Benefits

- Reduce or eliminate the need for Lower Controllers 'fat fingering' control data into simulations.
- Enable Command and Intelligent Agents in simulations / robots.
- Reduce time and effort by only having to input units / graphics once into system since they are stored and are accessible through a common database.
- Facilitates auto-fill of large portions of units Operational Orders based on data from a higher headquarters' Operational Orders.
- Reduce time / effort to produce Operational Orders.
- Increase preciseness and conciseness in communications.
- Improve Service, Joint, Combined, and Coalition interoperability.

# BML Representation – 5Ws

## Division Mission

Division attacks on order in zone to seize OBJ SLAM.



## C2 Plans & Orders (C2IEDM)

As Graphics

As Data

## Division Concept of Operations

Who	What	When	Where	Why
BLUE-MECH-BDE1	Attacks	On order	Zone	Fix (MRR1)
BLUE-MECH-BDE2	Attacks	On order	Zone	Penetrate (MRR2)
BLUE-ARMOR-BDE1	Follows & Assumes (B-M-BDE2)	On order	Zone	Seize (OBJ SLAM)
BLUE-AVN-BDE	Occupy	On order	AA EAGLE	Reserve
BLUE-ARMOR-BN1	Follow and Support (B-A-BDE1)	On order	Zone	Support (B-A-BDE1)
BLUE-CAV-SQN1	Screen	On order	Zone (PL AMBER to PL BLUE)	Protect (Division left flank)
BLUE-MECH-TM1	Tactical Combat Force	On order	DSA	Protect (Division Rear Area)

# Why 5W Representation?

- **WHO**: which unit is to accomplish the task.
  - Normally identified by a Unit\_ID.
  - When Unit\_ID is in doubt, could be identified by location.
  - Could be identified by ROLE (Main Effort, Security Force, etc.)
- **WHAT**: the task to be accomplished.
  - Could be either an operation or as in the US by designating an ARTEP task.
  - Selection maybe dependent on how much the higher commander wants to limit his subordinate. The more specific the task the less it conforms to “mission type”.
- **WHEN**: the timing of the task.
  - Control type (AT a certain time, NLT a certain time, EVENT\_PLUS\_T (D+1, H+2, etc.)
  - Parameters: (DTG, Event, Time, Unit\_ID, etc..)

# Why 5W Representation? (2)

**WHERE:** the location for accomplishing the task.

- Lat/Long, UTM, MGRS, etc.
- Terrain\_Feature\_ID, Graphic\_Control\_Measure\_ID

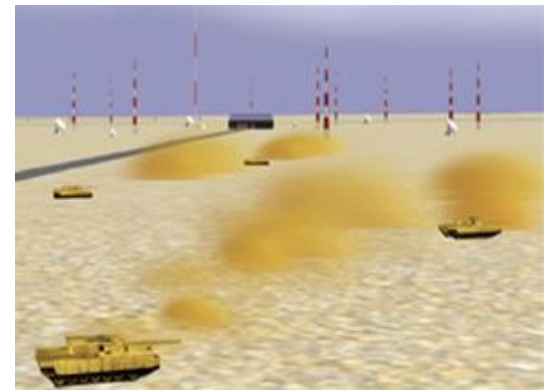
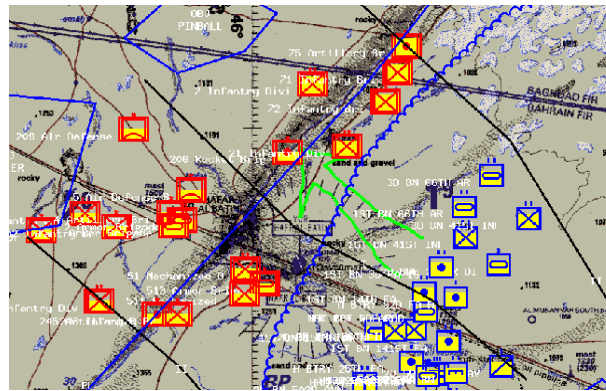
**WHY:** the reason for accomplishing the task.

- Purpose term. (Attrit, Defeat, Destroy, Contain, Clear, etc..)
- Parameters: (dependent on the term but required for clarification: Destroy what? Enemy Force, Terrain Feature)

**HOW:** In mission type orders, how to do a task is left up to the subordinate. The “general” ‘How’ for the order itself is found in the context of the Commander’s Intent and the Concept of Operations.

# The End State – A Personal View

- If we are to increase our operational effectiveness, then we must be able to communicate C2 information via the same C2 devices in all environments:
  - Both in training (Live, Constructive, Virtual) and on operations (soldier to soldier, soldier to robotics).
  - With the C2 devices **stimulating** and **being stimulated** by simulations where appropriate for training, wargaming and mission rehearsal.





# Questions

